OIPE IAP19
APR 04 2006
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Roland M. HOCHMUTH et al.	Docket No.:	10017760-1
SerialNo.:	10/004,191	Examiner:	Tung, Kee M.
Filing Date:	October 31, 2001	Art Unit:	2671
Entitled:	System and Method for Displaying an Image on a Network Attachable Display Device		

DECLARATION OF JOHNNY MARKS
UNDER 37 C.F.R. SECTION 1.131

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Johnny Marks, a co-inventor of the above-referenced patent application, am an employee of Hewlett-Packard Company, the assignee of this invention and application. Enclosed hereto as Exhibit A is a true copy of an invention disclosure form, with dates and portions redacted as noted, which was received by the Legal-Intellectual Property department of Hewlett-Packard Company on a date prior to

---

CERTIFICATE OF MAILING/TRANSMISSION (37 C.F.R. 1.8(a))

I hereby certify that, on the date shown below, this correspondence is being:

MAILING

☑ deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: MAIL STOP: Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

FACSIMILE

☐ transmitted by facsimile to the Patent and Trademark Office.

Signature: Cindy C. Dioso
Cindy C. Dioso

Date: March 30, 2006

July 2001, in the ordinary course of business as part of Hewlett-Packard Company's invention disclosure program, and which indicates a conception of the invention which is the subject of the above-referenced patent application on a date(s) prior to July 2001. In accordance with Hewlett-Packard Company's invention disclosure program at that time, upon receipt of an invention disclosure document from an inventor, the invention disclosure document is dated with the date of receipt by the Legal Intellectual Property department of Hewlett-Packard Company and assigned a docket number.

The invention that is the subject matter of the above-referenced application was conceived and constructively reduced to practice while working in the United States for Hewlett-Packard Company.

The invention disclosure form attached hereto as Exhibit A includes an explanation of the subject matter of the claims of the present application. Specifically, at least pages 3-5 of the invention disclosure form include an explanation of the subject matter of the claims of the present application.

I was diligent in constructively reducing the invention to practice from a date prior to July 2001 until the filing of the present application on October 31, 2001. For example, on a date(s) after receipt of the invention disclosure form by the Legal-Intellectual Property department of Hewlett-Packard Company, I participated in a meeting(s) by telephone with a patent attorney, Anand Gupta, authorized and appointed by Hewlett-Packard Company to prepare the present application. I worked substantially and continuously with Anand Gupta from such time(s) of such meeting(s) until the present application was mailed to the United States Patent Office on October 31, 2001. Attached hereto as Exhibit B is a letter received from Anand Gupta on a date after July 2001 but before October 31, 2001, which evidences the attachment of a draft of the present application for my review.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE

Johnny Marks

Signature _____ Date: 3/23/2006

Citizenship: United States of America

Residence: Fort Collins, Colorado

3-26-2006 11:29PM FROM P.1

Write in Dark Ink on Front Side Only, Please

COPY

INVENTION DISCLOSURE TCD-SCL

PAGE ONE OF ____

PDNO 10017760 DATE RCVD REDACT ATTORNEY KmH

*Instructions: The information contained in this document is **COMPANY CONFIDENTIAL** and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.*

Descriptive Title of Invention:
Network attached Display Device

Name of Project:
IVA

Product Name or Number:
IVA PCI

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):
REDACT

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):
REDACT

Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s):
REDACT

If any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at 1-898-4919 or 970-898-4919.

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.) REDACT

Was the invention built or tested? If so, the date: REDACT

Was this invention made under a government contract? If so, the agency and contract number: REDACT

Description of Invention: *Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).*

A. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)
B. Advantages of the invention over what has been done before.
C. Problems solved by the invention.
D. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on this date: [ ].

Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
REDACT	Roland Hochmuth	Roland C. Hochmuth	REDACT		REDACT
REDACT	John Marks	John Marks	REDACT		REDACT

(If more than four inventors, include additional information on another copy of this form and attach to this document)

REDACT

Write in Dark Ink on Front Side Only, Please

INVENTION DISCLOSURE COMPANY CONFIDENTIAL PAGE ____ OF ____

Signature of Witness(es): *(Please try to obtain the signature of the person(s) to whom invention was first disclosed.)*

The invention was first explained to, and understood by, me (us) on this date: [ ]

Full Name	Signature	Date of Signature
Full Name	Signature	Date of Signature

Inventor & Home Address Information: *(If more than four inventors, include addl. information on a copy of this form & attach to this document)*

Inventor's Full Name

Roland Hochmuth

Street

REDACT

City State Zip

REDACT

Do you have a Residential P.O. Address? P.O. BOX City State Zip

No.

Greeted as *(nickname, middle name, etc.)* Citizenship

Roland USA

Inventor's Full Name

John Marks

Street

REDACT

City State Zip

REDACT

Do you have a Residential P.O. Address? P.O. BOX City State Zip

No.

Greeted as *(nickname, middle name, etc.)* Citizenship

John USA

Inventor's Full Name

Street

City State Zip

Do you have a Residential P.O. Address? P.O. BOX City State Zip

Greeted as *(nickname, middle name, etc.)* Citizenship

Inventor's Full Name

Street

City State Zip

Do you have a Residential P.O. Address? P.O. BOX City State Zip

Greeted as *(nickname, middle name, etc.)* Citizenship

REDACT

Description of Invention

This invention disclosure describes a network attached display device. The display device is similar to existing display device in that it allows output from a graphics card to be display on it. A diagram of the invention is shown in Figure 1 Logical Diagram. The network attached display device would be composed of the following functions:

1. Display surface, preferably flat panel.

2. Standard network interface port such as Ethernet, Infiniband, Fiber Channel, or other.

3. Embedded frame-buffer decompression engine or logic. The basic functionality of this component is to uncompress images into frame-buffer memory.

4. Embedded display refresh unit or logic. The basic functionality of this component is to refresh the display and potentially blt images from one area of the frame-buffer to another.

5. Frame-buffer memory and off-screen memory.

6. Optional mouse, keyboard and other peripherals, ports, and other peripherals such as CD and speakers. You name it.

The logic for the network port, IVA, display logic, and potentially even memory could all be implemented on a single chip.

A diagram of the invention is shown in.

The basic operation of the invention is as follows:

1) Receive compressed images over a network from a network attached graphics device, server, board, appliance or other. The compressed images in this case would be compressed frame-buffers or regions of a frame-buffer. The invention disclosure "Network Attached Graphics Adapter" and "Internet Graphics Appliance" cover several methods the compressed images would be generated.

2) As the compressed images are received to decompress the images directly into local display device memory. It may be possible with some compression algorithms to perform the decompression of the image at vertical retrace speeds. This might make it possible to decompress the image directly into the display buffer without requiring double-buffering to avoid tearing. I suspect that this would not be possible initially based on the complexity of the algorithms. Another variation would be to decompress the image, if it is a full-screen image, into another part of off-screen memory, and then change the current display refresh pointer. In the case that the region is only a sub-region of the frame-buffer the image would be composed into the display buffer at the proper location.

3) If required, the display device blts the uncompressed image into the region of memory that the display refresh is occurring from.

4) The display refresh unit reads the uncompressed images from the local memory in the display device and refreshes the display at refresh rates.

Advantages over Prior Art

- Lower latency: The advantage over current approaches using a PC is that the PC must receive the compressed image over a network card into system memory. Assuming the decompression is happening on a PCI card, the compressed image must be transmitted to the PCI card. The PCI card would then uncompress the image and transmit it back into system memory. The image would then be blt to the graphics card requiring transmittal over the AGP bus. The blt could be to the front/display buffer. However it may be necessary to blt to the back buffer first to avoid tearing. I don't know if we can do sync blt's from system memory to frame-buffer memory. After the blt is completed a double-buffer swap could be initiated. All this data movement increases latency and is rather costly to implement.

- Lower cost: Another obvious advantage is just cost. A single chip that has the IVA, blt, display refresh, and network logic integrated with a display device would be much cheaper as compared to using a PC with lot's of other components.

- Remote visualization of graphics device output anytime and anywhere: Since this invention is dependent on network based transmittal of graphics display refresh the display device can be located anywhere on a network and is independent of distance limitations.

- Decouples display refresh from the graphics adapter. Consequently, for images that are changing less than display refresh rates, the graphics device requires fewer memory accesses. This frees of memory bandwidth for rasterization, texture mapping, and other graphics rendering operations.

Write in Dark Ink on Front Side Only, Please

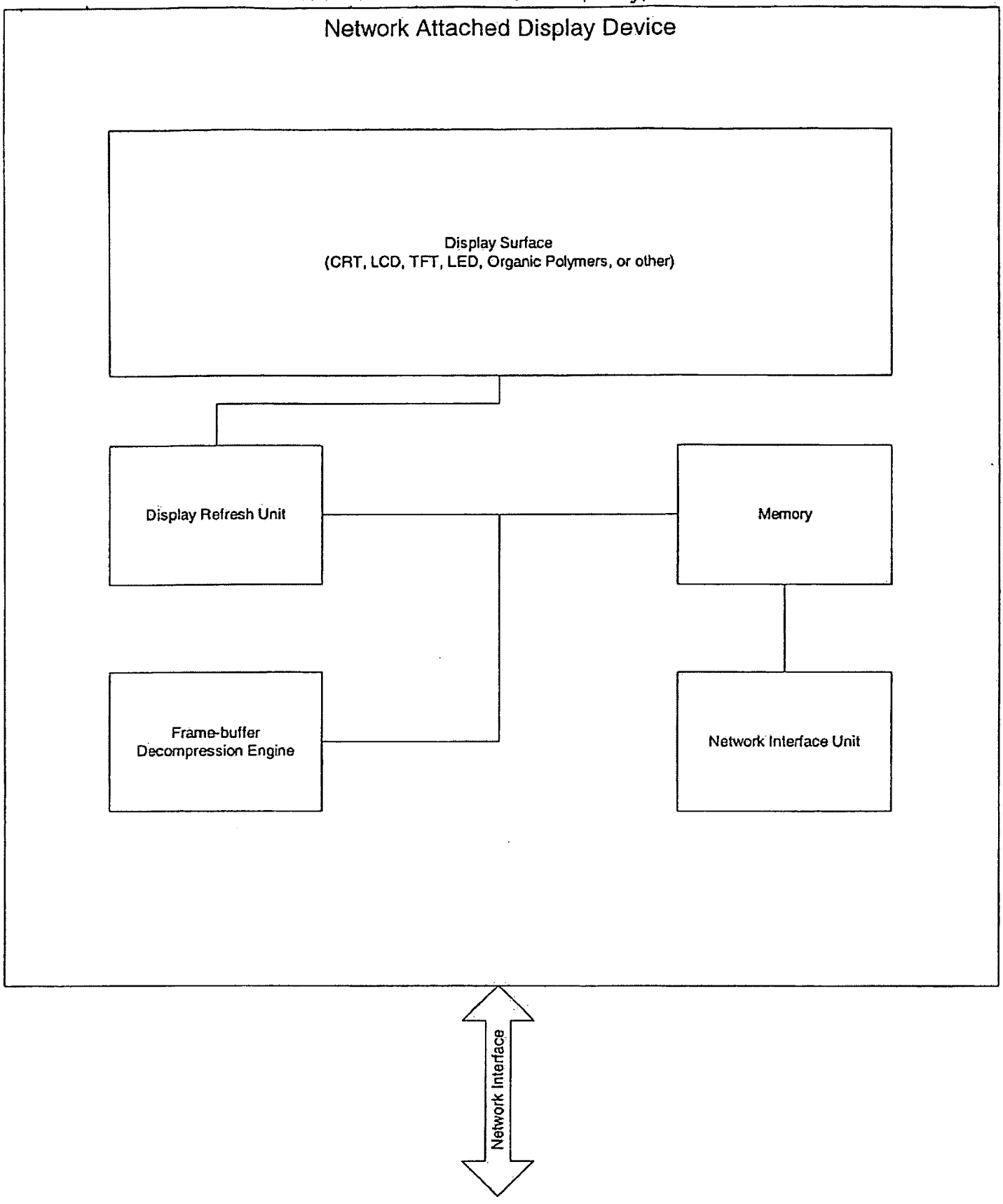

Figure 1 Logical Diagram

REDACT

ATTORNEYS & COUNSELORS

MUNSCH
HARDT
KOPF &
HARR, P.C.

DALLAS I AUSTIN

4000 FOUNTAIN PLACE
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2790

TELEPHONE (214) 855-7500
FACSIMILE (214) 855-7584

WEBSITE WWW.MUNSCH.COM

WRITER'S DIRECT DIAL

214 855-7519
agupta@munsch.com
Direct Fax No. 214-978-5304

REDACT

Mr. Roland Hochmuth
Hewlett-Packard Company
3404 E. Harmony Road
Fort Collins, CO 80527

Re: U.S. Patent Application
Entitled: SYSTEM AND METHOD FOR DISPLAYING AN IMAGE ON A DISPLAY DEVICE
Your Ref. No.: 10017760-1
Our File No.: 5804.57-1

U.S. Patent Application
Entitled: SYSTEM AND METHOD FOR COMMUNICATING GRAPHICS IMAGE DATA OVER A COMMUNICATION NETWORK
Your Ref. No.: 10017761-1
Our File No.: 5804.58

Dear Roland:

Enclosed are draft copies of the above-identified applications for patent along with a copy of the drawings. Please coordinate with all other inventors of each patent application for their careful review to see that the documents accurately and adequately describe the invention. **After the review, please fax or e-mail any changes or corrections to me.**

Please note that the inventor has a duty to disclose material prior art to the PTO. Such prior art includes relevant patents and printed publications, information concerning public use of methods or apparatus related to the invention, and information on public use or sales of the invention (or related methods or apparatus) made more than a year ago. Failure to disclose such prior art may invalidate any patent issuing on the application.

Should you have any questions or comments, please do not hesitate to contact me.

Sincerely,

Anand Gupta

AG:vc
Enclosures

cc: L.Joy Griebenow (via facsimile w/attachments)
REDACT

OIPE IAP19 APR 04 2006 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Roland M. HOCHMUTH et al.	Docket No.:	10017760-1
SerialNo.:	10/004,191	Examiner:	Tung, Kee M.
Filing Date:	October 31, 2001	Art Unit:	2671
Entitled:	System and Method for Displaying an Image on a Network Attachable Display Device		

DECLARATION OF ROLAND M. HOCHMUTH UNDER 37 C.F.R. SECTION 1.131

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Roland M. Hochmuth, a co-inventor of the above-referenced patent application, am an employee of Hewlett-Packard Company, the assignee of this invention and application. Enclosed hereto as Exhibit A is a true copy of an invention disclosure form, with dates and portions redacted as noted, which was received by the Legal-Intellectual Property department of Hewlett-Packard Company on a date prior to July 2001, in the ordinary course of business as part of Hewlett-Packard Company's

CERTIFICATE OF MAILING/TRANSMISSION (37 C.F.R. 1.8(a))

I hereby certify that, on the date shown below, this correspondence is being:

MAILING

☑ deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: MAIL STOP: Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

FACSIMILE

☐ transmitted by facsimile to the Patent and Trademark Office.

Signature: Cindy C. Dioso
Cindy C. Dioso

Date: March 30, 2006

date prior to July 2001, in the ordinary course of business as part of Hewlett-Packard Company's invention disclosure program, and which indicates a conception of the invention which is the subject of the above-referenced patent application on a date(s) prior to July 2001. In accordance with Hewlett-Packard Company's invention disclosure program at that time, upon receipt of an invention disclosure document from an inventor, the invention disclosure document is dated with the date of receipt by the Legal Intellectual Property department of Hewlett-Packard Company and assigned a docket number.

The invention that is the subject matter of the above-referenced application was conceived and constructively reduced to practice while working in the United States for Hewlett-Packard Company.

The invention disclosure form attached hereto as Exhibit A includes an explanation of the subject matter of the claims of the present application. Specifically, at least pages 3-5 of the invention disclosure form include an explanation of the subject matter of the claims of the present application.

I was diligent in constructively reducing the invention to practice from a date prior to July 2001 until the filing of the present application on October 31, 2001. For example, on a date(s) after receipt of the invention disclosure form by the Legal-Intellectual Property department of Hewlett-Packard Company, I participated in a meeting(s) by telephone with a patent attorney, Anand Gupta, authorized and appointed by Hewlett-Packard Company to prepare the present application. I worked substantially and continuously with Anand Gupta from such time(s) of such meeting(s) until the present application was mailed to the United States Patent Office on October 31, 2001. Attached hereto as Exhibit B is a letter received from Anand Gupta on a date after July 2001 but before October 31, 2001, which evidences the attachment of a draft of the present application for my review.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE

Roland M. Hochmuth

Signature Roland M. Hochmuth Date: 3/23/2006

Citizenship: United States of America

Residence: Fort Collins, Colorado

Write in Dark Ink on Front Side Only, Please

COPY

INVENTION DISCLOSURE

TCD-SCL

PAGE ONE OF ____

PDNO 10017160

DATE RCVD REDACT

ATTORNEY KmH

*Instructions: The information contained in this document is **COMPANY CONFIDENTIAL** and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.*

Descriptive Title of Invention:
Network attached Display Device

Name of Project:
IVA

Product Name or Number:
IVA PCI

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):
REDACT

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):
REDACT

Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s):
REDACT

If any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at 1-898-4919 or 970-898-4919.

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.) REDACT

Was the invention built or tested? If so, the date: REDACT

Was this invention made under a government contract? If so, the agency and contract number: REDACT

Description of Invention: *Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).*

A. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)
B. Advantages of the invention over what has been done before.
C. Problems solved by the invention.
D. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on this date: [ ].

Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
REDACT	Roland Hochmuth	Roland L. Hochmuth	REDACT		REDACT
REDACT	John Marks	John Marks	REDACT		REDACT

(If more than four inventors, include additional information on another copy of this form and attach to this document)

REDACT

Write in Dark Ink on Front Side Only, Please

INVENTION DISCLOSURE COMPANY CONFIDENTIAL PAGE ____ OF ____

Signature of Witness(es): *(Please try to obtain the signature of the person(s) to whom invention was first disclosed.)*

The invention was first explained to, and understood by, me (us) on this date: [ ]

Full Name	Signature	Date of Signature
Full Name	Signature	Date of Signature

Inventor & Home Address Information: *(If more than four inventors, include addl. information on a copy of this form & attach to this document)*

Inventor's Full Name

Roland Hochmuth

Street

REDACT

City State Zip

REDACT

Do you have a Residential P.O. Address? P.O. BOX City State Zip

No.

Greeted as *(nickname, middle name, etc.)* Citizenship

Roland USA

Inventor's Full Name

John Marks

Street

REDACT

City State Zip

REDACT

Do you have a Residential P.O. Address? P.O. BOX City State Zip

No.

Greeted as *(nickname, middle name, etc.)* Citizenship

John USA

Inventor's Full Name

Street

City State Zip

Do you have a Residential P.O. Address? P.O. BOX City State Zip

Greeted as *(nickname, middle name, etc.)* Citizenship

Inventor's Full Name

Street

City State Zip

Do you have a Residential P.O. Address? P.O. BOX City State Zip

Greeted as *(nickname, middle name, etc.)* Citizenship

REDACT

Description of Invention

This invention disclosure describes a network attached display device. The display device is similar to existing display device in that it allows output from a graphics card to be display on it. A diagram of the invention is shown in Figure 1 Logical Diagram. The network attached display device would be composed of the following functions:

1. Display surface, preferably flat panel.

2. Standard network interface port such as Ethernet, Infiniband, Fiber Channel, or other.

3. Embedded frame-buffer decompression engine or logic. The basic functionality of this component is to uncompress images into frame-buffer memory.

4. Embedded display refresh unit or logic. The basic functionality of this component is to refresh the display and potentially blt images from one area of the frame-buffer to another.

5. Frame-buffer memory and off-screen memory.

6. Optional mouse, keyboard and other peripherals, ports, and other peripherals such as CD and speakers. You name it.

The logic for the network port, IVA, display logic, and potentially even memory could all be implemented on a single chip.

A diagram of the invention is shown in.

The basic operation of the invention is as follows:

1) Receive compressed images over a network from a network attached graphics device, server, board, appliance or other. The compressed images in this case would be compressed frame-buffers or regions of a frame-buffer. The invention disclosure "Network Attached Graphics Adapter" and "Internet Graphics Appliance" cover several methods the compressed images would be generated.

2) As the compressed images are received to decompress the images directly into local display device memory. It may be possible with some compression algorithms to perform the decompression of the image at vertical retrace speeds. This might make it possible to decompress the image directly into the display buffer without requiring double-buffering to avoid tearing. I suspect that this would not be possible initially based on the complexity of the algorithms. Another variation would be to decompress the image, if it is a full-screen image, into another part of off-screen memory, and then change the current display refresh pointer. In the case that the region is only a sub-region of the frame-buffer the image would be composed into the display buffer at the proper location.

3) If required, the display device blts the uncompressed image into the region of memory that the display refresh is occurring from.

4) The display refresh unit reads the uncompressed images from the local memory in the display device and refreshes the display at refresh rates.

REDACT

Advantages over Prior Art

- Lower latency: The advantage over current approaches using a PC is that the PC must receive the compressed image over a network card into system memory. Assuming the decompression is happening on a PCI card, the compressed image must be transmitted to the PCI card. The PCI card would then uncompress the image and transmit it back into system memory. The image would then be blt to the graphics card requiring transmittal over the AGP bus. The blt could be to the front/display buffer. However it may be necessary to blt to the back buffer first to avoid tearing. I don't know if we can do sync blt's from system memory to frame-buffer memory. After the blt is completed a double-buffer swap could be initiated. All this data movement increases latency and is rather costly to implement.

- Lower cost: Another obvious advantage is just cost. A single chip that has the IVA, blt, display refresh, and network logic integrated with a display device would be much cheaper as compared to using a PC with lot's of other components.

- Remote visualization of graphics device output anytime and anywhere: Since this invention is dependent on network based transmittal of graphics display refresh the display device can be located anywhere on a network and is independent of distance limitations.

- Decouples display refresh from the graphics adapter. Consequently, for images that are changing less than display refresh rates, the graphics device requires fewer memory accesses. This frees of memory bandwidth for rasterization, texture mapping, and other graphics rendering operations.

REDACT

Write in Dark Ink on Front Side Only, Please

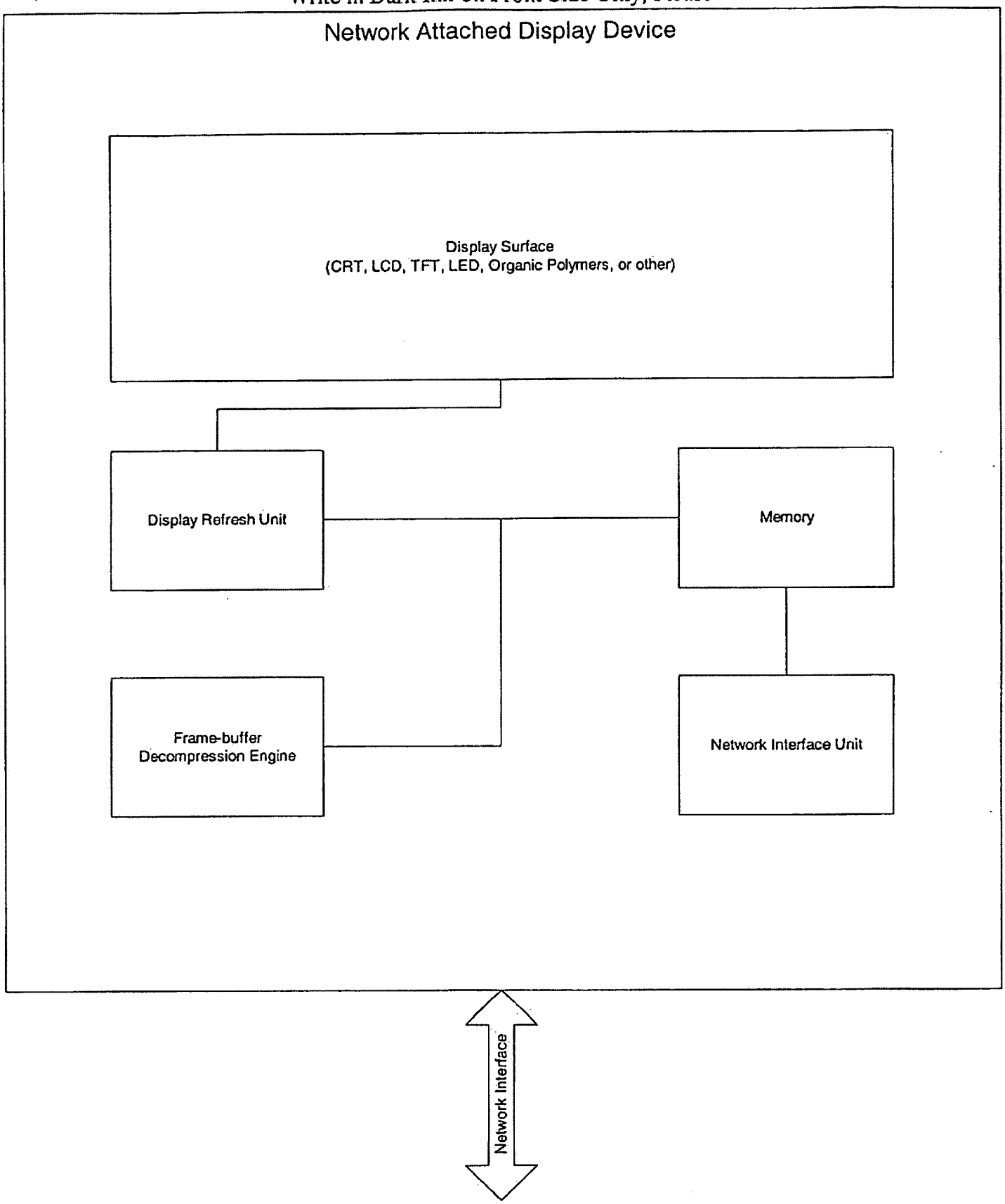

Figure 1 Logical Diagram

REDACT

ATTORNEYS & COUNSELORS

MUNSCH
HARDT
KOPF &
HARR, P.C.

DALLAS | AUSTIN

4000 FOUNTAIN PLACE
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2790

TELEPHONE (214) 855-7500
FACSIMILE (214) 855-7584

WEBSITE WWW.MUNSCH.COM

WRITER'S DIRECT DIAL

214 855-7519
agupta@munsch.com
Direct Fax No. 214-978-5304

REDACT

Mr. Roland Hochmuth
Hewlett-Packard Company
3404 E. Harmony Road
Fort Collins, CO 80527

Re: U.S. Patent Application
Entitled: SYSTEM AND METHOD FOR DISPLAYING AN IMAGE ON A DISPLAY DEVICE
Your Ref. No.: 10017760-1
Our File No.: 5804.57-1

U.S. Patent Application
Entitled: SYSTEM AND METHOD FOR COMMUNICATING GRAPHICS IMAGE DATA OVER A COMMUNICATION NETWORK
Your Ref. No.: 10017761-1
Our File No.: 5804.58

Dear Roland:

Enclosed are draft copies of the above-identified applications for patent along with a copy of the drawings. Please coordinate with all other inventors of each patent application for their careful review to see that the documents accurately and adequately describe the invention. **After the review, please fax or e-mail any changes or corrections to me.**

Please note that the inventor has a duty to disclose material prior art to the PTO. Such prior art includes relevant patents and printed publications, information concerning public use of methods or apparatus related to the invention, and information on public use or sales of the invention (or related methods or apparatus) made more than a year ago. Failure to disclose such prior art may invalidate any patent issuing on the application.

Should you have any questions or comments, please do not hesitate to contact me.

Sincerely,

Anand Gupta

AG:vc
Enclosures

cc: L.Joy Griebenow (via facsimile w/attachments)
REDACT